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THE PLANT DISEASE REPORTER

Issued by

THE PLANT DISEASE SURVEY, DIVISION OF MYCOLOGY AND DISEASE SURVEY
BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING
AGRICULTURAL RESEARCH ADMINISTRATION
UNITED STATES DEPARTMENT OF AGRICULTURE

Volume XXVIII January 1, 1944 Number 1

The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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BEAN DISEASES IN COLORADO IN 1943

W. J. Zaumeyer

Weld County. The total bean acreage in this County was approximately 127,000 acres in 1943. This is about a 50 percent increase over the acreage grown 5 years previously. Of this acreage, about half was produced under irrigation and the balance under dry-land conditions. Less than 2000 acres of the beans grown under irrigation were garden varieties grown for seed, the balance being planted to Pinto, a field bean variety.

Bacterial blights (Xanthomonas phaseoli and Pseudomonas medicaginis var. phaseolicola). These diseases were observed to a very limited extent and were of minor importance. Some fields showed a small percentage of infection but most were free from the diseases. This was possibly due to 2 factors: (1) High temperatures and low humidities that prevailed during most of the season, which prevented development and spread of the organism; (2) the seed source of most of the acreage was of blight-free origin, viz., Idaho or California. In a few instances, when locally-grown seed was planted, more infection was noted than when seed from other sources was planted. In other cases locally-grown seed produced healthy crops. Fields planted with seed of Wyoming origin were likewise very free from the diseases. Although both bacterial blights are present to some extent every year, there has been no severe outbreak since 1937.

In 1937 (fig. 1) the rainfall and humidity were above normal, combined with subnormal or normal temperatures in June and July which enhanced the secondary spread and development of the bacterial blights from the primary sources of infection. By the early part of August, the infection was very widespread and the exceedingly high temperatures that prevailed then caused defoliation and premature death of infected plants with large reductions in yields.

In 1943 and, in fact, during all seasons since 1937, during which the bacterial blights were of minor consequence, the average monthly mean temperatures were in general above normal. This condition, together with subnormal rainfall and humidity, reduced the possibility of secondary blight infection by killing most of the primary-infected seedlings. As a result, above-normal or normal precipitation and humidity for August would be only a minor factor in the dissemination of the diseases because of the elimination of the primary-infected plants.

In June 1937 (fig. 1) the total precipitation for Greeley, Colorado, was 2.85 inches, a departure of +1.30 inches from the normal. It was recorded on 13 days of the month. The mean temperature for the month was 65.2° F., a departure of -1.2° from normal. In contrast, the total precipitation for June 1943 was 0.77 inches, a departure of -0.78 inches from normal. This precipitation was recorded on 10 days of the month. The mean temperature for the month was 65.3° F., a departure of -1.5°, which was about the same as for June 1937.

In July 1937 (fig. 1) the total precipitation was 1.53 inches. In July 1943, the total rainfall was only 0.62 inches, a departure of -1.19 inches from normal. In 1937 precipitation was recorded on 14 days in July as compared with 7 days for July 1943. In July 1937 the mean temperature was 74° F., while in July 1943, the mean temperature was 75.1° F., a departure of +3.0° from the normal.

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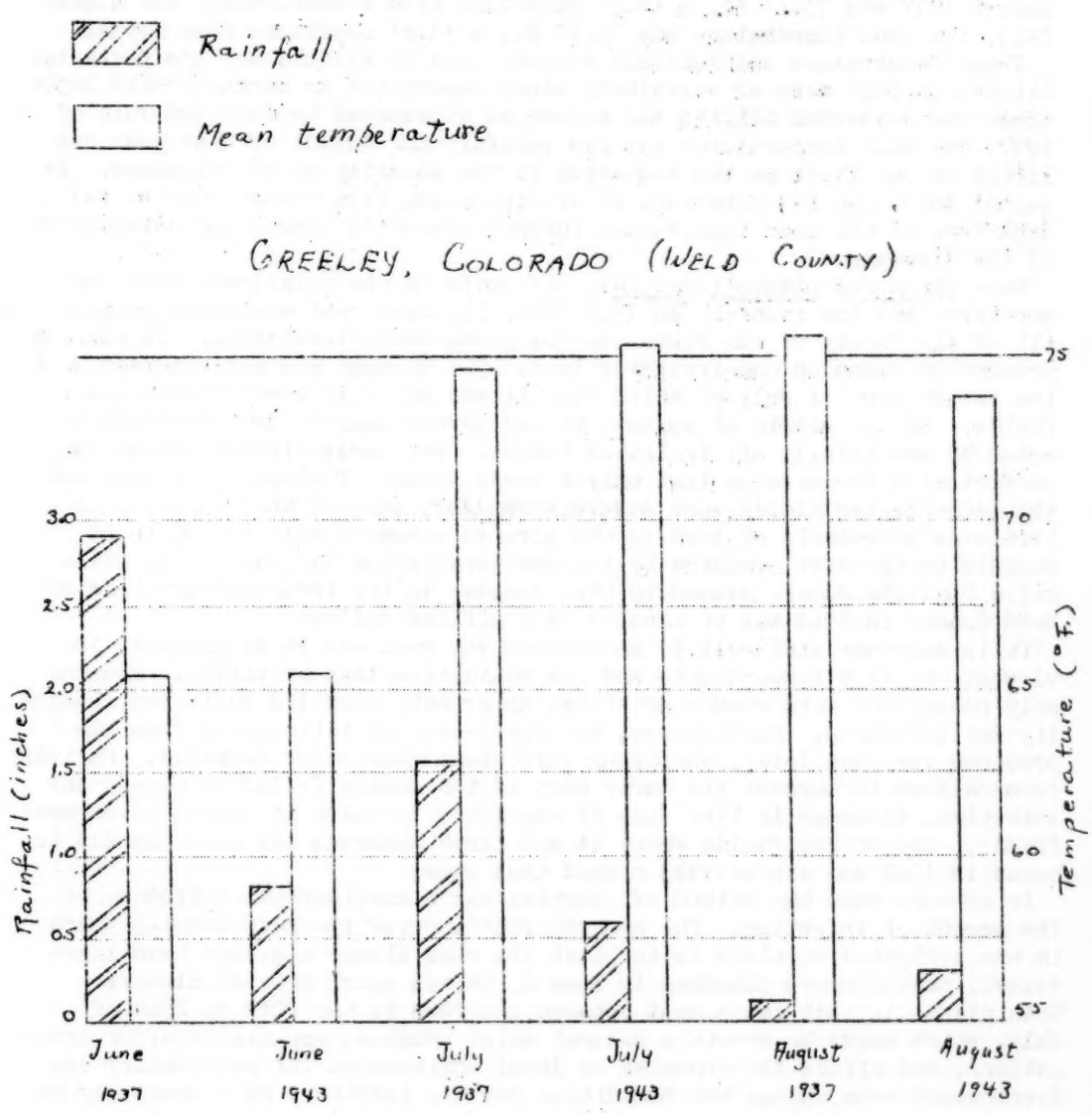


Figure 1. Rainfall and mean temperature at Greeley, Weld County, Colorado, in June, July, and August, 1937 and 1943.

The total precipitation for August 1937 (fig. 1) was only 0.13 inches, a -1.11 departure from normal. In August 1943, the total precipitation was 0.27 inches, a -0.97 departure from normal. The mean temperature for August 1937 was 75.4° F., a +5.5° departure from normal, while for August 1943, the mean temperature was 74.2° F., a +3.6° departure from normal.

These temperature and rainfall records tend to explain why the bacterial blights in 1943 were of relatively minor importance as compared with 1937. Since the bacterial blights had become so widespread in June and July of 1937, the high temperatures and low rainfall for August of that year had little or no effect on the reduction of the severity of the diseases. In August 1943, the (-) departure of precipitation from normal and the (+) departure of the mean temperature further prevented spread and development of the diseases.

Rust (Uromyces phaseoli typica). In spite of the relatively high temperatures and low rainfall in 1943 (fig. 1), bean rust was found in almost all of the fields of the Pinto strains grown under irrigation. It was not present on beans on non-irrigated land. The disease was not observed until the latter part of July at which time it was noted in a relatively few fields. By the middle of August, it had spread rapidly and infection was noted in practically all irrigated fields. The early-planted acreage was sufficiently advanced so that only a small amount of damage resulted, but the late-planted fields were severely damaged, some of them yielding as little as 10 bushels of seed to the acre as compared with the 30 to 40 bushels to the acre produced by the earlier-planted fields. It is estimated that the damage caused by this disease in the irrigated sections of Weld County in 1943 was at least a half million dollars.

It is somewhat difficult to understand why rust was so widespread, in view of the high temperatures and low humidities that prevailed. Reasonably heavy dews were common and these apparently supplied sufficient humidity for infection. Furthermore, the carry-over of teliospores from the previous year was large, supplying sufficient spores for inoculum. Periodic examinations throughout the early part of the season failed to reveal any infection, although in late July it was noted to quite an extent in several fields. One of the fields where it was first observed had been planted to beans in 1942 and was heavily rusted that year.

It appears that the method of planting has a considerable influence on the amount of infection. The general practice for the past several years in the irrigated sections is to plant the rows closer together than heretofore, most farmers planting in rows 24 inches apart or even closer. Bean plants in such cases meet between the rows by the 20th to 25th of July, which tends to create a natural moist chamber, especially after irrigations, and offers the organism an ideal environment for germination and development even though the humidities for the territory as a whole may be very low. Planting in wider-spaced rows of approximately 28 to 30 inches apart would, it is believed, prevent the organism from developing so early in the season and hence cause less crop loss.

Mosaic, common bean mosaic (bean virus 1). This disease was quite widespread in the Pinto bean acreage of the irrigated sections. In some fields as many as 50 to 75% of the plants were infected. In former years when the old native Pinto variety was used exclusively, mosaic was of minor significance. Within recent years, however, earlier strains have been developed, viz., Idaho Pinto and Wyoming Pinto, which are a great deal more

susceptible to the virus than the old type. In the dry-land sections of the county where only the old type is grown because of its drought tolerance, mosaic was of no importance.

Among the garden bean varieties, mosaic was of minor importance.

The red node disease reported to be caused by a virus was noted occasionally in a number of plantings but was of very minor importance.

Other Diseases. Root rots (Fusarium and Rhizoctonia sp.). These diseases were of very minor importance and although they were found on the roots of plants in many fields, they caused no appreciable reduction in yield.

Montezuma County. The total bean acreage in this county was about 80,000 acres. All of the beans grown were of the Pinto variety and over 90% of the acreage was grown under dry land conditions. The survey was made during the first week in September.

Bacterial blights. In the acreage inspected, none of these diseases was observed.

Rust. No rust was observed in the acreage inspected.

It is of interest to note that, in spite of the relatively high rainfall and the not excessively high mean temperatures, especially during the months of July and August (fig. 2) no bacterial blight or rust was noted. It is seen that the total rainfall for July 1943 was 2.11 inches, a departure of +0.35 inches from the normal. This is somewhat greater than for Weld County in July 1937, when the bacterial blight diseases were very serious, and considerably higher than for Weld County in July 1943 (fig.1). In August 1943, the rainfall for the Cortez section was 2.35 inches (fig. 2), a +0.81 departure from the normal, whereas for the Greeley section, the total rainfall for August 1937 was only 0.13 and for 1943 was 0.27 inches (fig. 1).

It is believed that the absence of bacterial blight and rust in this territory is due to the low humidity in the immediate vicinity of the plants. Since the bean crop is grown mostly under dry-land conditions, the plants do not attain the growth that they do under irrigation. Furthermore the rows are 36 inches apart with fewer plants in the row than under irrigated conditions. As a result, the bean rows never grow together, and this results in considerable aeration and hence a much lower humidity than in irrigated fields.

Mosaic. A trace of common bean mosaic was noted in most of the fields examined.

Root rots (Fusarium sp.). In one large field a considerable number of plants had died from what appeared to be a Fusarium wilt organism. The plants wilted rapidly after they had attained considerable growth and death followed shortly thereafter. The disease was not widespread and was noted in only one planting of several hundred acres.

Mesa County. The total acreage of beans planted in this county was about 12,000 acres, all being of the Pinto variety. The survey in this territory was made during the first week of September.

Bacterial blights. Only a mere trace of these diseases was noted in a small percentage of the fields visited.

Rust. This disease was not observed.

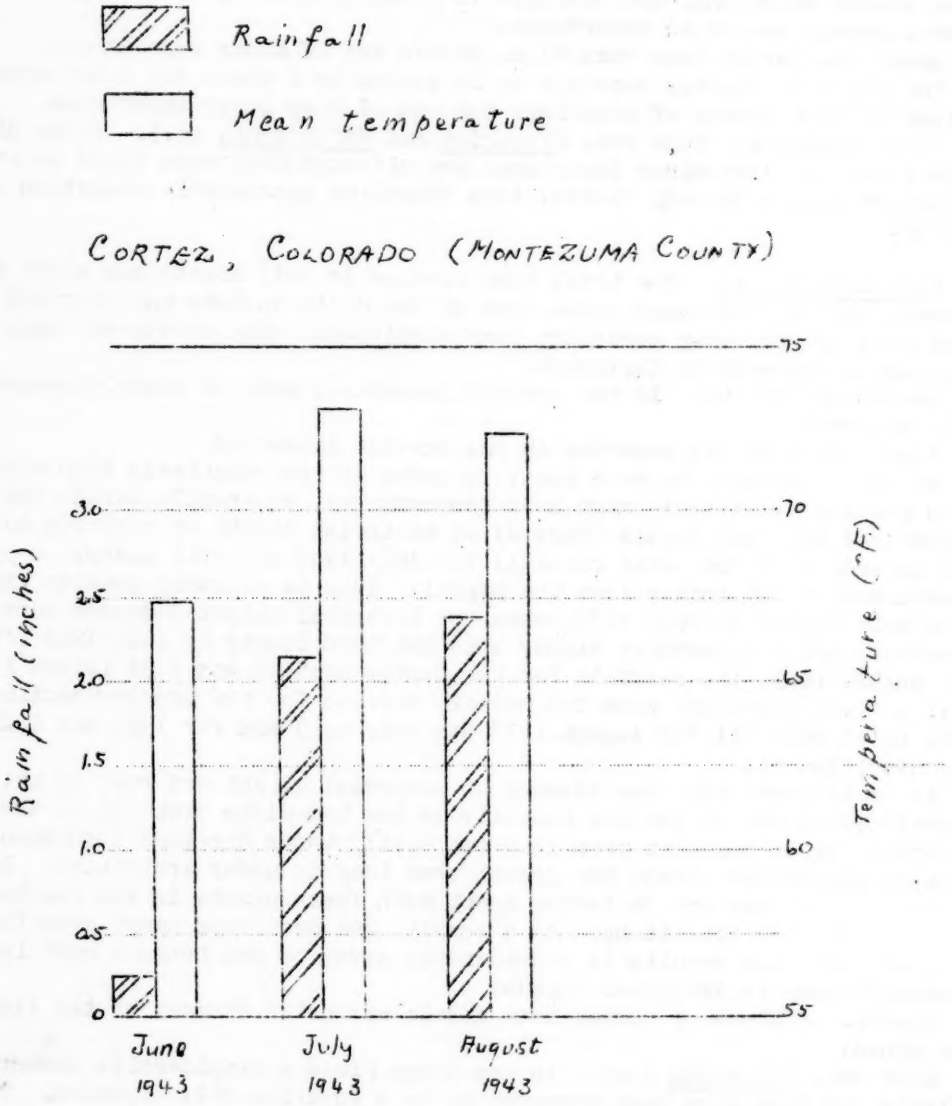


Figure 2. Rainfall and mean temperature at Cortez, Montezuma County, Colorado, in June, July, and August, 1943.

Mosaic. In plantings of the old native Pinto variety, only a small percentage of the plants showed infection. Where the Idaho and Wyoming strains were planted, a very high percentage of the plants were infected, in some cases as high as 50 to 60%, with a decided reduction in yield.

Root rot (Fusarium solani f. phaseoli). This disease was quite common throughout the bean-growing sections of the country. In many cases where crop rotation was not practiced and where beans had been planted on the same land for a number of years, a high percentage of the plants were infected. In several instances as many as 10% of the plants had been killed, whereas in other cases from 1 to 3% of the plants had died. Beans planted on land that had grown alfalfa in immediately preceding years showed no infection.

Physiological. Throughout most of the territory, a condition of unknown causation was noted. It starts at about podding time, when the leaves begin to show an unhealthy chlorotic appearance. The plants mature several weeks before the normal time, resulting in poor plant and pod development and hence a decided reduction in yield. Few of the affected fields yielded more than 1000 pounds to the acre which is poor for beans under irrigation. This condition, according to growers, was not observed previous to 1933-1935 but has become increasingly worse from year to year. Previous to the appearance of this trouble, beans yielded in the neighborhood of 1800 to 2000 pounds per acre.

Very few, if any, of the fields observed were entirely free from this trouble. Beans planted on land that had been in alfalfa the previous year showed much less of this condition than on land that had been planted to beans for several years.

It is believed that the cause of the trouble may be due to a low availability of one of the essential elements in the soil.

DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

FUNGICIDAL DUSTING OF TOMATOES APPLICABLE TO HOME GARDENS IN ARKANSAS, SEASON 1943

H. R. Rosen

Since most experimental work on fungicidal sprays and dusts are primarily designed for the control of diseases in commercial fields, and since much of this is impractical or not applicable to the usual small home garden, the work here reported was designed to determine the value of fungicidal applications as they may apply to home gardens. It was confined to one type of fungicide applied as a dust and combined with an arsenical for the control of chewing insects.

The difficulty of obtaining good coverage of leaves with small sprayers, the high cost of good sprayers, and the task of carrying heavy sprayers filled with liquid, which often falls upon the woman of the household, all indicate the impracticability of spraying in the home garden.

On the other hand, small, fairly efficient, light weight, and comparatively inexpensive hand dusters are available. This added to the fact that the time consumed in dusting is a mere fraction of that necessary to apply an adequate spray, makes dusting far more desirable and practical for

the home gardener.

The dust mixture used was essentially the same as the writer has used for a number of years in the control of black spot of roses (Phytopath. 32:15, 1942). The differences are that yellow cuprous oxide was used instead of red, and the arsenical increased slightly. The mixture as used on tomatoes consisted of the following (by weight): 2% yellow cuprous oxide, 4% calcium arsenate, 10% wheat flour, and 84% talc. Note that this mixture contains less than 50% of the copper often recommended (see Doolittle, U. S. Dept. Agr. Farmers' Bull. 1934, 1943).

The number and timing of applications was governed by rains. Because of the frequent and heavy rainfall in May and June, and heavy dews in parts of July, 10 dustings were considered necessary in that period and only 3 applications thereafter, or a total of 13. This number of applications is far greater than the 3 to 5 usually recommended. However, while 13 applications may be unnecessary in the average season, it appears doubtful if 3 to 5 applications would be sufficient in the home garden where planting is often made in early May and where fall frosts may not appear until November.

The varieties used were Dwarf Stone, Bonny Best, Break O'Day, and Marglobe. The data on Break O'Day are not presented because of a failure to record part of the yield. The rows were all 100 feet long. There were 2 such rows of Dwarf Stone, one dusted and the other untreated, 6 rows of Bonny Best, 3 dusted alternating with 3 controls, and 2 rows of Marglobe, one dusted and the other serving as a check.

Because of the extreme number of rainy days in the early part of the season, both early blight [Alternaria solani] and septoria leaf spot [Septoria lycopersici] appeared in severe epidemic form, killing many of the leaves in the first half of the season on all unprotected plants. Flea beetle injury was also very abundant in this period on undusted plants. (Identification of injury made by Dwight Isely, Entomologist, Arkansas Agricultural Experiment Station.)

Contrasted with the undusted checks, the dusted plants showed much less leaf spotting and retained their leaves in such greater numbers that when the extreme heat and drought appeared, very little of their fruit needed to be discarded because of sun scald up until mid-August. On the other hand, much of the difference in yield recorded below of dusted and undusted plants was due to the greater numbers of sun-scalded fruits on the undusted plants.

The yields per row in grams (average of 3 each of dusted and undusted in Bonny Best) were as follows:

	Dwarf Stone	Bonny Best	Marglobe
Dusted	4730	13920	23480
Undusted	3470	8000	16050

Since there was no artificial watering given the plants during the drought, almost all of the yields were obtained during July and August. From August 23 to the end of the season only one picking was possible and that was very light.

The yield data seemingly indicate that dusting in the home garden was desirable in 1943 but until more data are at hand, no recommendation can be made.

AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF ARKANSAS

RESULTS OF VEGETABLE SEED TREATMENT IN ARKANSAS, SEASON 1943

H. R. Rosen

Since there were no data on the desirability and effectiveness of seed treatment for the control of various diseases of vegetables in Arkansas, it was thought desirable to undertake such work, particularly as it pertained to home gardens during war time.

Experience has shown that the home gardener is not likely to use any expensive or laborious method; nor is he likely to use any treatment at all, if he is told that different kinds of treatments are required for different kinds of plants.

With these facts in mind, it was decided to use one chemical only and to restrict the treatment to the seeds of those crops which competent pathologists have found to respond economically over relatively wide areas. The chemical chosen was Semesan since it was commonly recommended, was readily obtainable, with reasonable assurance that it would be available for such purposes during the war period, and had been tested by numerous pathologists over a considerable number of years. The crops chosen for treatment were peas, beans, and sweet corn. (Beans were included because 2 neighboring States have obtained good results from seed treatments.)

Results of Treating Pea Seeds. The variety of peas chosen was Dwarf Telephone. Two pounds were treated at the rate of 1/2 teaspoonful per pound and 2 left untreated, permitting the planting of 4 rows, 100 feet long, the treated rows alternating with the untreated. Counts of stand, made shortly after emergence, were as follows: total of untreated rows, 1152 plants; treated rows, 1561 plants; percentage increase in stand of treated over untreated, 35. Yields of peas (including pods) were: untreated, 8355 grams; treated, 8450 grams.

Obviously there was no significant difference in yield between treated and untreated. As the yields indicate, this was an exceptionally poor season for peas in this State, largely because of unfavorable weather conditions. However, considering the costs of seeds and chemical, the difference in stand indicates that seed treatment was economically desirable in 1943 since approximately 2/3 pound of treated seeds per 100-foot row would give a stand as good as 1 pound of untreated seed. So long as pea seeds are high-priced and not over-abundant, it appears that seed treatment is desirable in this State, and that the rate of planting may well be reduced from the common practice of using 1 pound per 100 feet to 2/3 pound if the seeds are treated.

Results of Treating Bean Seeds. Two varieties of snap beans were used, Asgrow's Stringless Black Valentine and Landreth's Stringless Greenpod. One pound of the first was treated, one untreated, allowing the planting of 4 rows, 2 representing treated seed alternating with 2 rows representing untreated seed, each row 100 feet long. Two pounds of the second variety were treated and 2 left untreated, giving 4 rows or replicates each of treated and untreated seeds.

Counts of stands and yields were as follows:

	Asgrow	Landreth
Average stand per row		
treated	595	425
untreated	577	411
Average yield per row in grams		
treated	7933	8938
untreated	7058	9004

The results both in stand and in yield seemingly suggest that in 1943 seed treatment of beans was of no value.

Results of Treating Sweet Corn Seeds. Two varieties of sweet corn were used, Golden Bantam and Golden Cross Bantam, and 2 pounds of each variety were treated, 2 left untreated, thus enabling the growing of 4 rows 100 feet long of untreated alternately planted between 4 rows of treated seeds of each variety. Counts of stands and yields were as follows:

	Golden Bantam	Golden Cross Bantam
Average stand per row		
treated	638	717
untreated	548	588
Average yield per row in grams		
treated	11365	10724
untreated	11460	10735

The results suggest that seed treatment was of questionable value since the differences in stand between treated and untreated were statistically not significant and thinning had to be practiced in both treated and untreated. The yields also indicate that the much higher priced, wilt resistant Golden Cross Bantam yielded no better, if as well as, the older Golden Bantam. This was no surprise since no bacterial wilt was observed. However, since a severe summer drought interfered with the filling out of ears much more in the hybrid than in Golden Bantam, and since the former produced a greater number of ears, it is possible that Golden Cross Bantam may give superior yields in the average year even in the absence of bacterial wilt.

AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF ARKANSAS

DISEASES OF POTATOES AND OTHER VEGETABLES IN STORAGE

POTATO STORAGE DISEASES IN NEW HAMPSHIRE. One day was spent in northern New Hampshire in the Coos County potato region. Fifteen potato bins, all of Green Mountain, were examined in 6 commercial storage houses in Colebrook, Lancaster, and Milan.

Late blight (Phytophthora infestans) was found in all 15 bins. Infected tubers ranged from a trace to 35% with an average of 4%. Excluding the one badly affected bin with 35%, the average of the other 14 bins was 1.8%, indicating a very slight amount of blighted tubers considering the fact that all bins had some late blight.

Rhizoctonia (Rhizoctonia solani) was found in slight amounts in 3 bins.

Scab (Actinomyces scabies) occurred in slight amounts in 7 bins.

Net necrosis (leaf-roll virus) occurred in 6 bins of which 5 contained only a trace, and 1 bin 15% affected tubers; this was also the bin containing 35% late blight.

Stem-end browning (cause unknown) was present in all 15 bins but only 3 had more than a slight amount. The range was from a trace to 10% affected tubers.

Three bins had some rot caused by field frost; a trace in 2 bins and 7% in 1.

Sunburn (non-parasitic) occurred in 5 bins; a trace in 4 and 7% in 1 bin.

Thirteen bins in 9 storages in Barnstead, North Barnstead, Pittsfield, Durham, Strafford Ridge, Litchfield, Marlo and Westmoreland were visited.

Only a trace of blackleg (Erwinia atroseptica) [E. phytophthora] was found in one bin in Pittsfield.

Late-blight was found in 5 of the 13 bins. None were appreciably affected by blight rot as it occurred only in traces to slight amounts.

Rhizoctonia occurred in 8 of the 13 bins. The greatest prevalence in any one bin was 5% and the average of the 8 bins was 1.5%.

Scab was found in 8 bins ranging from a trace to 85%. Five of the bins had only a trace or slight amount; however, one bin had 10%, another 40%, and another 85%.

Nine of the 13 bins were Green Mountains; 6 of these 9 bins had net necrosis. Four of the affected bins had 1% or less netted tubers, one bin in Barnstead had about 36% and another in Marlo about 60%.

Stem-end browning occurred in 10 of the 13 storages. It was present in all 9 of the Green Mountain bins and also in 1 bin of Katahdins. Prevalence ranged from a trace to 20%, with an average of 6.6% for the 10 bins.

Field frost damage was found in slight amounts only in 9 of the 13 bins.

Two bins were seen where growth cracks were present in slight amounts.

Hollow heart occurred as a trace in 5 of the 13 bins.

Five bins had a trace of sunburn tubers and a sixth bin, of Katahdins, had about 4% affected tubers.

In a large storage at Dover, New Hampshire, where Maine grown potatoes were being sacked and shipped, considerable trouble was encountered from tuber rots. It was thought by those in charge that there would be a loss of from 12,000 to 25,000 bushels of the original 50,000 stored. Secondary bacterial rots were so common that the original cause could scarcely be identified. However, it seemed that field frost damage played a major role in the spoilage. Late blight could be identified occasionally and there was possibly some ring rot, although the latter is not definitely determined and its presence is being checked by Dr. M. C. Richards. -- Robert C. Cassell, Emergency Plant Disease Prevention Project. December 12-18; 19-24.

POTATO STORAGE DISEASES IN VERMONT: During the week December 12 to 18 42 potato bins in 11 storages in Essex, Orleans, Caledonia, Orange, Windsor, and Windham Counties were examined including 4 commercial storages and 7 fairly large home storages in the towns of Guildhall, Greensboro Bend, East Hardwick, Randolph Center, Braintree, Bridgewater, Woodstock, Pomfret, Sharon, White River Junction, and Bellows Falls.

Late blight was found in 26 of the 42 bins. Thirteen bins had a trace only and the 2 most seriously affected bins had 50 and 60% blighted tubers respectively. Blighted tubers averaged 6.5% for the 26 bins. Some of the 42 bins represented field-run potatoes and others had been graded once and even twice. In this northern and eastern section of Vermont inexperienced growers with 2 or 3 acres of potatoes lost most of their crop from late blight. Other experienced growers lost from 1/2 to 2/3 of their crop, and many did not dig all of their acreages. Growers who sprayed thoroughly, using high pressure equipment, suffered v e r y l i t t l e loss from blight.

Rhizoctonia occurred in 8 bins in Windsor and Windham Counties. At Woodstock and Bridgewater 2 bins had 35% and 40% affected tubers, respectively, with considerable sclerotial coverage.

Ring rot (Corynebacterium sependonicum) was found in 1 bin in Greensboro Bend of potatoes grown in Albany; about 10% of the tubers were affected. The rot was all in a dry state and a hold-over of early storage rot. There had been no recent rot development.

Scab was found in 11 bins but not in quantities serious enough to reduce commercial value.

Thirty-one bins of the 42 were Green Mountains and 18 of the 31 bins had net necrosis. Affected tubers ranged from a trace to 35% with an average amount of 6.3% for the 18 bins. Seven bins had over 5% netted tubers.

Stem-end browning occurred in 29 of the 42 bins. Affected tubers ranged from a trace to 25% with an average of 4.5% in the 29 bins. Seven bins had 5% or more affected tubers.

Field frost injury was found in 6 of the 42 bins. Five bins had a trace only and 1 bin about 5% affected tubers.

Six bins were found with a trace of hollow heart. It occurred in Katahdin, Sebago and Houmas.

Sunburn was found in 16 bins. In 13 bins there was a trace only. In 1 bin there was about 1%, in another 2%, and in a third (Katahdin) 5%.

Eight bins in 6 storages were inspected in Windham County, December 26 to 31. The storages were located in Westminster, Rockingham, Whitingham and Williamsville. The completion of Windham County terminates a rather thorough survey of potato storages in Vermont. The work in Windham County was not as complete as it should have been and it was not possible to visit some of the larger storages because the roads were impassable.

Late blight. Late blight was found in 7 of the 8 bins. In 3 of the bins there was a trace only; 1 bin had about 1%; 2 bins about 5%; and 1 bin about 75%. The grower of the latter bin of potatoes in Westminster lost about 2/3 of his crop of a few hundred bushels.

Rhizoctonia was found in 6 bins. There was only a trace in 3 of the bins, but about 10% of affected tubers in 1 bin, and 15% in the other 2.

Scab was found in 4 bins. Affected bins ranged from 5 to 20% infected tubers with an average of about 9%.

Net necrosis was found in 6 of the 8 bins. Affected tubers in the 6 bins ranged from 1% to 70% with an average infection of 27%. Five of the 6 bins were Green Mountains and the other bin was Houmas. The Houmas were about 30% affected. The Houma seed was tuber-unit certified stock from Maine.

Stem-end browning was found in 6 of the 8 storages. There was a trace only in 3 of the bins; 1 bin had 10% affected tubers; 1 bin 20%; and 1 bin 25%.

Five of the 8 bins shewed a trace of field sun-burn. -- Robert C. Cassell, Emergency Plant Disease Prevention Project.

POTATO DISEASES IN STORAGE IN MINNESOTA: A survey of potatoes in storage was made in northcentral Minnesota from December 19 to December 22.

Late-blight infected tubers were seen in all warehouses but very little loss is resulting from this disease. Heaviest late blight infection was seen in one warehouse in Becker County where Ohios were infected less than 1%. Cobblers in storage there had a trace of blighted tubers.

A few tubers infected with jelly-end rot (Fusarium javanicum var. radicicola) were found in 2 warehouses in Beltrami County. Very little soft rot was seen and only one bin with a trace of ring rot (Corynebacterium sepedonicum) was observed.

Early blight tuber rot (Alternaria solani) of Cobblers occurred in one area in St. Louis County and on the same farm as in previous years, up to 50% of the tubers being infected. This tuber rot appears to be restricted to one locality in Minnesota, although vine infection with early blight was heavy throughout the State in 1943. -- Ian W. Tervet, Emergency Plant Disease Prevention Project.

DRY ROTS OF STORED RUTABAGAS IN MINNESOTA: Waxed rutabagas in storage were infected with dry rots in a warehouse in Beltrami County. At least 70% of the roots were infected to some degree and 25% of the roots were unfit for market. Two distinct types of rot were present. One, a dark brown to black rot caused by Alternaria herculea (Ell. & Mart.) Elliot, appeared to be most common but was not causing less loss than the second. A consisently isolated Fusarium apparently invaded bruises or cuts on the root and caused a breakdown of the flesh, resulting in a white lesion streaked with red and surrounded by a dark margin. The skin covering the rotted areas was gray and somewhat depressed. -- Ian W. Tervet, Emergency Plant Disease Prevention Project. Week ending December 26

SQUASH STORAGE DISEASES IN NEW HAMPSHIRE: Five squash storages were visited in southern New Hampshire, in Barnstead, Pittsfield, Concord, Derry, and Litchfield, containing originally from 125 to over 400 tons. In most storages squash was not keeping well and was being sold out. The Litchfield storage was best-equipped for squash storage; condition was much better there than in other storages and very few squash had been sold from it.

Black rot (Mycosphaerella citrullina) was by far the most prevalent and most destructive disease in all 5 storages, infected fruits ranging from about 2% in the Litchfield storage to about 48% in the Concord storage, averaging about 24% in all 5 storages.

Rhizopus rot (Rhizopus nigricans) was the only other disease found in all 5 storages; its prevalence ranged from a trace to about 4% with an average of about 1.5%.

Botrytis rot (Botrytis cinerea) was present in 3 storages; only a trace was found in 2 but about 8% occurred in the Barnstead storage.

A trace of bacterial-wilt rot (Erwinia tracheiphila) was found in the Litchfield storage; a trace of rot caused by Fusarium sp. in the Barnstead storage. A trace of Sclerotinia rot (Sclerotinia sclerotiorum) was reported to have been present in the Barnstead storage in November but none was found in December. Rot caused by Alternaria sp. was present on a few frozen fruits in the Derry storage.

Greatest losses probably occurred in the Concord and Barnstead storages. In Concord where over 400 tons were stored, about 25% of the fruit was a complete loss, and an additional 25% could be salvaged as canning squash. In the Barnstead storage of 175 tons loss was probably 35%. Black rot was the cause of most of the loss. -- Robert C. Cassell, Emergency Plant Disease Prevention Project. December 19 - 24.

DISEASES OF SWEETPOTATOES IN STORAGE IN ILLINOIS: Sweetpotatoes in 5 commercial storage houses located at Anna, Cobden, and Dongola in Union County, were examined for rots. The sweetpotatoes in this area usually are stored in ventilated bushel baskets and then are cleaned, graded, and repacked before removing from the storage house. In each of the storage houses the sweetpotatoes appeared to be in excellent condition and consisted mainly of the Nancy Hall and Yellow Jersey varieties.

The most serious losses were from black rot (Ceratostomella fimbriata). The managers at 4 of the storage houses mentioned that they had graded and packed 5 lots of sweetpotatoes containing between 30 and 60% black-rot infected roots. Each lot comprised between 400 and 600 bushels. Examination disclosed that occasional lots contained from 4 to 6% black rot infection. However, most lots were practically free from this disease. The estimated average loss from black rot was about 1%.

Losses from ring-rot (Rhizopus nigricans) ranged from 0.5 to 6% and averaged about 1%.

A trace to 0.5% of dry rot (Fusarium sp.) was found in all of the lots of potatoes examined. -- R. C. Baines, Emergency Plant Disease Prevention Project. Week ending December 18

SPINACH DISEASES IN OKLAHOMA

D. A. Preston

Spinach is important in Oklahoma, constituting one of the more important truck crops that is grown on the rich bottoms along the Arkansas River and its tributaries, the Canadian, Neosho, Poteau, and Verdigris Rivers in the eastern part of the State. As a commercial crop the culture of spinach in Oklahoma is centered in the following Counties: Tulsa, Wagoner, Muskogee, McIntosh, Haskell, Sequoyah, and LeFlore. The fall crop of spinach (1943) in Oklahoma constituted an estimated acreage of 18,000 acres. Individual farms varied in the amount of spinach planted for commercial purposes from three to one thousand acres.

A large portion of the spinach was destined for war contracts, about one-half for canning, and the remaining for fresh market, the latter being shipped in many cases to distant points (Canada). The variety of spinach most commonly used by growers in this region is a Bloomsdale variety, with some Old Dominion, Virginia Savoy, and Giant Nobel being used also. A great deal of the spinach seed is sown broadcast, while some is drilled, and some is planted in raised beds. Spinach grows well on a wide variety of soils, but it yields best on a heavy loam. Well-drained alluvial soils, silt, clay, and sandy loams are used fairly widely. Most of the land in Oklahoma on which spinach is grown was subjected to severe flood conditions last spring, with up to two feet of silt or sand being deposited on top of the normal heavy loam soil. Most fields had histories of repeated spinach culture at least once, sometimes twice a year. Some of the growers do follow a system of crop rotation, in which alfalfa or some other legume and other truck crops complete the rotation.

A severe outbreak of white rust and downy mildew in the Muskogee area this fall was reported to the Department of Botany and Plant Pathology at Oklahoma A. & M. College (PDR 27(25):708-710. Dec. 15, 1943). At the urgent request of growers and County Agents, Dr. K. Starr Chester made an inspection of the Muskogee spinach-growing area. The extensive damage to fall spinach, together with the lack of a complete picture of the disease situation in Oklahoma made it advisable for a comprehensive disease survey of the entire spinach-growing area to be undertaken.

From December 6 through December 20, 1943 a survey trip was made through the spinach-growing areas in Oklahoma for the purpose of determining the nature and extent of diseases prevalent on the fall crop. Spinach crops were examined in the following counties: Tulsa, Wagoner, Muskogee, McIntosh, Haskell, Sequoyah, and LeFlore. The spinach inspected was in all stages of maturity, ranging from young seedlings to mature plants ready for harvest. The outbreaks of spinach diseases this fall were associated with a past month in which there was practically no rainfall. Throughout this period, however, the temperatures were in the range of 40-50° F., and there were numerous heavy dews. Dry weather somewhat retarded growth of the crop. At the outset of the survey trip there were 2 days of rainy weather, followed by a cold spell, with temperatures ranging from 12-35°. The diseases and pests of spinach that were found during the survey are given in the following paragraphs.

Downy Mildew or Blue Mold. (Peronospora spinaciae Laubert) [P. effusa] causes indefinite and spreading, watersoaked leaf spots that are yellowish on the upper surface and covered with a blue or purplish mass of spores on the lower surface. The most seriously affected areas of the leaf turn brown and die. This disease was found in nearly all of the areas inspected, including Tulsa, Wagoner, Muskogee, Haskell, Sequoyah, and LeFlore Counties. This disease is the one most feared by the growers and has caused severe damage to spinach in the past, especially in spring crops. This fall the prevalence of downy mildew in individual fields of spinach ranged all the way from none or a trace to 100%, with an overall average of not over 5%.

White Rust (Albugo occidentalis Wilson) is very easily recognized by the small white pustules, comprising masses of conidia, mainly on the lower surface of the leaf, but in severe cases on the upper surface also. The spots on the upper surface resemble somewhat those produced by downy mil-

dew, but do not have the watersoaked appearance of the latter. The affected portions of the leaves eventually turn brownish and die. Yellowing and mosaic-like colorations of affected leaves without white pustules may be present at times. This disease was found in Wagoner and Muskogee Counties only. A single field in southwestern Wagoner County showed a trace of this disease. In Muskogee County this disease was limited to the Muskogee, Wybark, and Ft. Gibson areas, where prevalence ranged from a mere trace to 40% in individual fields.

Heterosporium Leaf Spot (Heterosporium variabile Cke.). This fungus causes a leaf spot on both surfaces of the leaf. The spots are visible as large circular necrotic areas covered with brown to black masses of hyphae and conidia. The disease does not ordinarily become severe until the spinach plants are almost mature, or have been weakened in some manner. It was found in nearly all of the areas inspected, including Tulsa, Wagoner, Muskogee, McIntosh, Haskell, Sequoyah, and LeFlore Counties. Prevalence in individual fields ranged all the way from none or a mere trace to 100%, with an overall average of not over 5%. One 50-acre field in Muskogee County, planted with a Bloomsdale variety, showed 100% infection. A 75-acre field of Giant Nobel in LeFlore County showed 2%.

Mosaic (blight) (Cucumber mosaic virus). Symptoms include a yellowing or mottling of the leaves; the petiole may become erect while the leaf blade curls toward the base of the plant, giving a very compact appearance. This disease was found in Muskogee County only, varying from a trace to 75% in prevalence.

Rootknot (Heterodera marioni (Cornu) Goodey). Wherever rootknot is present the spinach plants are usually dwarfed in size and the leaves may turn brown and die in severe cases. Ordinarily the leaves remain green, but are much smaller than normal. At the outer edges of the areas of infestation in the field the aboveground appearance of the plants was perfectly normal, yet, in all cases, the typical root swellings were present. This disease was found in 2 localities only, Tulsa and Muskogee Counties. In Tulsa County rootknot was found infecting spinach plants in an 80-acre field (sandy soil) near Bixby. Here 2 roughly circular areas, each of approximately one acre in extent, were found in which 70% of the plants had been killed by the rootknot nematode. These infested areas were both in low places in the field, and the typical rootknots could be found on 100% of these plants. In Muskogee County near Braggs a 20-acre field (sandy soil) showed rootknot nematode injury to 50% of the plants in 2 acres of the field.

Grubworm Injury. The causal agent has not been determined; possibly the damage is due to the activities of the larvae of the rough-headed corn stalk-beetle (Euetheola rugiceps Lec.). The affected plants usually wilt rapidly, turn yellow and die. The tap root is usually chewed completely through. This leaves an open wound which is readily attacked by species of Rhizoctonia and Fusarium, leaving the cut end of the root blackened. Grubworm injury was found in nearly all of the areas inspected, including Tulsa, Wagoner, Muskogee, McIntosh, Haskell, Sequoyah, and LeFlore Counties. The prevalence of this trouble ranged all the way from none or a mere trace to 25% in individual fields, with an overall average prevalence of a trace. The practice of following corn with spinach seems to increase the amount of grubworm injury; one grower reported that a field of spinach following corn had been wiped out by this trouble last year.

A report of disease findings in the various counties has been prepared for each of the County Agents in the spinach-growing region of the State. It is reported that there will be a much larger acreage devoted to the culture of spinach next spring. The growers claim that downy mildew is much more prevalent on the spring crop than on the fall crop. In order to help clarify the disease problems involved in growing spinach in this region, another extended survey trip through the area during the coming spring is desirable. This might help to solve also the unanswered problem of how downy mildew survives the hot summer months, it being reported that no spinach is in the vegetative condition during this period.
EMERGENCY PLANT DISEASE PREVENTION PROJECT.

NEMATODE SURVEY IN FLORIDA

A. L. Taylor

The nematodes mentioned in the preceding report (PDR 27(25): 707. Dec. 15, 1943) in association with "red root" of celery, as belonging to "a genus closely related to Paratylenchus," have been identified by Dr. G. Steiner as Dolichodorus heterocephalus Cobb 1914, or a form exceedingly close to it. Previously this species has been reported only from fresh water.

The period from December 13 to 18 was spent in the vicinity of Orlando, Florida. Fields in Orange and Seminole Counties were examined. In this vicinity, the principal crops beside citrus fruit are tomatoes, peppers, cabbage, potatoes, and ornamental plants of various descriptions. The facilities of the U. S. Department Agricultural Experiment Station at Orlando were used for laboratory work.

Citrus Root Nematode. Though it was not planned to make a thorough examination of citrus trees at this time, root samples from Valencia orange, Mandarin orange and Walker grapefruit were collected on the grounds of the Experiment Station at Orlando. On all of these roots, large numbers of nematodes, either the citrus nematode, Tylenchulus semi-penetrans, or a closely related species were found. Although this pest is common in California, it is supposed to be rare in Florida.

The fact that the citrus nematode was found in the very first sample of root examined indicates that it may be much more common in Florida than is generally suspected.

Banana Nematode. The banana nematode, Pratylenchus musicola, was found to be commonly associated with a root and stem rot of Chinese evergreens in a one-acre lath house near Orlando. Fair control of this nematode was obtained at this location on an experimental basis by the use of chloropicrin, Uramon and Dowfume Br-10. No control was obtained with formalin or cyanamide.

Rootknot Nematode. One tomato field was found to be 75% heavily infected with the rootknot nematode, Heterodera marioni. Reduction in yield due to this infection was estimated by the grower as about 1/3 of the crop. Distribution of the infection indicated that the source was the field soil and not the seedbed. The tomato crop was preceded by 2 crops of Crotalaria spectabilis. Before that the field had been out of cultivation for several

years. The Crotalaria had been sown broadcast and no attempt made to control weeds.

Near Orlando is the town of Winter Garden, formerly the center of an extensive cucumber-growing area. At present, only a few growers plant cucumbers. According to the local people, the growing of cucumbers became unprofitable in this section because of widespread rootknot infection. Cabbage is now the principal crop in this area, although there is some planting of lettuce, peppers, and potatoes.

In this vicinity, a heavy application of cyanamide was made on one field in an attempt to control rootknot. Soon after, it was noted that an adjacent citrus grove showed defoliation of trees near the edge of the treated area. Whether this effect was due to cyanamide fumes or to cyanamide contacting citrus roots extending into the field was not clear.

Five acres of celery seedbeds in the vicinity of Oviedo, where chloropicrin had been used to control rootknot, were found to be free of this pest. On other large seedbeds belonging to the same company, poor results were obtained with chloropicrin. This was apparently due to improper application. The chloropicrin was applied and the water turned into the subsurface irrigation system. The result was that the fumes were forced out of the soil. An adjoining field of newly planted celery lying in the direction in which the fumes were carried by the wind was seriously damaged.

In a home garden where chloropicrin was applied for rootknot control, the results were excellent so far as this pest was concerned. However, an orange tree, the roots of which extended into the treated area, was badly damaged, the roots being killed and the tree defoliated.

The week's observations point out the need for more practical large scale methods for the control of rootknot. Crotalaria is good only if kept carefully weeded, but this requires more work than the ordinary grower is prepared to devote to a cover crop. Although Crotalaria eventually reaches a considerable size, it starts to grow slowly and weeds easily obtain a good foot hold. In this section, excellent dense stands of Crotalaria were found to have an almost complete cover of Bermuda grass underneath.

Recommendations. 1. Research on large scale methods of root knot control is badly needed. As crops, soil types, climatic conditions, irrigation systems, etc., vary greatly from place to place, the work should be done on a regional basis. A procedure that is highly practical in one locality may not be so in another.

2. The experience with chloropicrin indicates the need for extensive educational work on soil fumigation before it will be safe and practical for the average grower. The same will undoubtedly apply to other chemical fumigants as well. Perhaps a more satisfactory solution of the problem would be for soil fumigants to be sold at a price including the application by trained and experienced men.

3. Further work on the distribution of the citrus nematode is needed. As much as possible will be done on the present survey, but it is probable that only the surface can be scratched in the time available.

From December 20 to 24, crops in the vicinity of Bradenton, were examined and the facilities of the Vegetable Crops Laboratory of the Florida Experiment Station were used for the examination of samples in the laboratory. Two days in the field were spent in company with Mr. F. P. Schlatter, also on the Plant Disease Prevention Project.

At the present time, the principal crops in this area are tomatoes, peppers, eggplant, squash, cabbage and broccoli, with a few small plantings of cucumbers, potatoes, beets, etc. In addition, a considerable amount of land is used for the production of cut flowers of gladiolus.

The principal farming areas are on Parkwood sand and sandy loam soils, although some Leon sand is used also. Because of frost danger, most farms are located near large bodies of water, usually along the Gulf coast or its bays, inlets and rivers. Artesian water is available for irrigation.

Rootknot Nematode. Tomatoes are grown in two ways - pruned and staked, or not staked. Larger yields are obtained by the first method, but it is also the most expensive. On some 30 acres of tomatoes examined, an average infection of about 5% with the rootknot nematode was found. As the picture was complicated by large amounts of Fusarium and bacterial wilts, no reliable estimate of rootknot damage could be obtained.

The squash crop is approaching the end of the season and many of the fields have been somewhat damaged by recent cold weather. On fields totaling 55 acres an average of about 8% infected plants were found, the parasite in each case being the rootknot nematode. Little damage from this cause could be found.

One 5-acre field of cucumbers had a rootknot infection of about 20%. On part of this field the soil contained a large proportion of fragments of oyster and other shell. According to the workers at the experiment station, the pH in such places is apt to be about 8.5. Rootknot was abundant on these spots as in places where the soil was free of shell fragments.

On 2 eggplant fields containing a total of 16 acres, only a trace of rootknot was found. On an eggplant seedbed of 800 sq. ft., 75% of the plants were lightly infected.

One planting of 4 acres of Bell peppers was found to be 50% infected with rootknot with some apparent stunting of the plants. This field was exceptional as only a trace of rootknot was found in other fields examined.

Only a trace of rootknot with no apparent damage was found on one 80-acre field of broccoli.

A very light infection of rootknot was found on a 4-acre beet field.

Generally speaking, rootknot infection in the fields examined was much lighter than might be expected where rootknot-susceptible crops are grown year after year in sandy soil. The reason for the absence of infection is not readily apparent. Soil temperatures are certainly high enough during the growing season (or at least that part of it which is past) for rootknot activity. While some effort is made to grow rootknot-immune crops during the slack season of the year (principally Crotalaria), little effort is made to control weeds and many farmers do not plant anything at all, but allow the weeds to grow. It is possible that the alternate soaking and draining of the land during the summer by the heavy rains characteristic of this region may have something to do with the light infection. To date, there is no good scientific evidence to support this. However, much of the land is low-lying and not adequately drained. During the rainy season, such land is either actually under water or watersoaked for several months.

Recommendations. 1. Flooding experiments and systematic observations on a fairly large scale should be conducted to determine the effect of flooding, watersoaking and alternate wetting and drying of the soil on

rootknot nematodes.

2. The absence of rootknot infection on eggplant and peppers and fact that uninfected volunteer gladiolus plants were often found growing within a few inches of heavily infected squash plants in one field suggests that definite strains of nematodes may be present in this region. A study of such strains might furnish information of great practical value.

Survey work in the vicinity of Bradenton, Florida, was continued December 27 to January 1.

Rootknot Nematode. At the Vegetable Crops Laboratory of the University of Florida Experiment Station, a 2-acre field planted to a variety test of tomatoes was examined for rootknot and Fusarium wilt with the help of Dr. A. L. Harrison, of that laboratory. All of the plants examined were found to be infected with the rootknot nematode, over 95% being heavily infected. About 70% of the plants had fusarium wilt infection. That this combination is very deadly to tomatoes was illustrated by the large proportion of dead plants in the field. No definite conclusions could be reached as to a possibility of correlation between infection by the 2 organisms. A superficial examination of an adjoining 8-acre planting of tomatoes showed a high incidence of rootknot infection here also. This field of sandy soil was well drained by means of a subsurface irrigation system.

Also on the Vegetable Crops Laboratory farm, a small planting of okra was examined. This was on soil on which heavily rootknot-infected tomatoes were growing last spring. Only a very light infection was found on the okra plants. This spot was poorly drained and had been flooded by heavy rains several times last summer.

Gladiolus is grown in the field for the cut flower market in this section. While the crop has an annual value of about $5,000,000 it is of interest during the present emergency only because the bulbs are planted on fields before and after vegetable crops. One such planting following a heavily rootknot-infected tomato crop was examined. Only a trace of infection was found on the gladiolus and on weeds (Amaranthus and Chenopodium spp.) in the field.

Just across a field road from this gladiolus planting a tomato field was examined. This field had been planted to tomatoes in the spring of 1943 and also in the spring of 1942. About 75% of the plants of the present crop were found to be moderately to heavily infected with rootknot. Both of these fields were reported to be well drained by means of subsurface irrigation systems.

On an 8-acre tomato field west of Bradenton, no rootknot was found. This field was not well drained and had been flooded or at least watersoaked several times during the last summer by heavy rains. (Note: This vicinity had about 60 inches of rain during July, August and September. Usual rainfall for this period is about 35 inches.)

On the same farm a 3-acre planting of eggplant was found to be about 50% infected with rootknot. This soil was used for eggplant last year. The soil was well drained. No estimate of the damage due to rootknot was made as over half of the plants had already been killed by soreshin.

In a poorly growing 2-acre planting of tomatoes on light sandy soil only a trace of rootknot was found. It was concluded that the poor growth was due to lack of fertilizer.

A 5-acre field of summer crookneck and acorn squash was found to have 50%

of the plants lightly infected with rootknot with no visible sign of damage. This crop followed gladiolus.

On a 10-acre tomato field which attracted attention because of poor growth of the plants, no rootknot was found with fairly thorough sampling. A considerable amount of Fusarium and bacterial wilt was present.

On a 3-acre planting of eggplant which was nearly wiped out by soreshin, heavy rootknot infection was found on 75% of the remaining plants. The soil was Leon sand and had been in cultivation only 4 years, having been used for gladiolus the first 2 years.

At a nursery near Oneco, some figs (Celeste and Brown Turkey varieties) grafted on native rubber tree stock were seen. Presumably the root stock was either Ficus populina or F. aurea, as these are the only 2 Ficus species listed as native in Small's Flora of the Southeastern States. According to the nurseryman, this rootstock is highly resistant to rootknot, though very susceptible to cold injury and somewhat difficult to handle in rooting and grafting. While numerous trees have been sold by this nursery, no information as to the value of these in producing fruit was available.

In general, the observations on rootknot in this section present a very confusing picture. Some evidence that more rootknot is found on well drained soil than on poorly drained soil is contained in the observations reported above. However, it is difficult to get exact information as to the past state of the fields examined. There is also some information indicating that strains of rootknot are involved. However, the evidence does not warrant drawing any definite conclusions, but merely emphasizes the fact that more exact observations and controlled experiments are needed.

Miscellaneous Nematodes. In soil and root samples examined for nematodes in the laboratory, large numbers of Cephalobus and Acrobeles spp. were found on rotted gladiolus bulbs. Primary cause of the rotting of the bulbs was reported to be Fusarium. Large numbers of nematodes of the Anguillulina group were found around tomato roots from the 10-acre field mentioned above. Aphelenchoides and Acrobeles were found associated with roots of diseased eggplants. Also in this sample were some specimens of Dorylaimus that appeared to be parasitized.

Recommendations. 1. A study of the effect of flooding and watersoaking of soil on the survival of rootknot nematodes is urgently needed.

2. Cross inoculation tests with rootknot nematodes from the principal crops of this area might yield some information of immediate practical value.

EMERGENCY PLANT DISEASE PREVENTION PROJECT

DISEASES IN WINTER VEGETABLE-GROWING AREAS (Fla., La., Tex., Calif.)

VEGETABLE DISEASES IN FLORIDA: West Coast Area - December 16 to 24. Trips taken into the field included a visit to the vegetable growing area around Fort Myers on December 16 and 17, with the County Agent from Lee County; a trip through the celery section around Sarasota, with Dr. A. L. Harrison of the Vegetable Crops Laboratory at Bradenton; and several trips into the vegetable growing areas of Manatee County, and also one to the Ruskin area of Hillsboro County. Several of the latter trips were made in company with Dr. A. L. Taylor, of the Emergency Plant Disease Prevention Project staff.

From December 17 to 21 following the cold wave in the North, there oc-

curred several nights of low temperatures in various areas, in many cases sufficiently low to have a killing effect on vegetation. While the extent or severity of the damage due to the cold was not uniform, depending on location, type of crop, protective measures adopted, etc., the aggregate loss to the more tender crops in general is estimated to be very serious. Some growers are reported to have suffered heavily in crop damage.

Celery. Many fields in the Sarasota area, totaling hundreds of acres in all stages of growth from seedbed to practically full growth for bleaching, were observed to be generally in good condition, with very little disease of any importance noticed. Cercospora early blight (Cercospora apii) and nematodes (probably Heterodera marioni) were found present in several abandoned seedbeds, and early blight infections could be found rather commonly in some of the older fields; infections were generally very scattered, however, and will probably have little if any damaging effect on the crop. No pink rot (Sclerotinia sclerotiorum) was observed on this trip. One grower stated that since the control of this disease through use of calcium cyanamide, and flooding of the fields after the crop is off, has become common practice in this area, pink rot has not been a factor among growers here for the last 3 years, whereas, prior to that time losses due to this trouble were very serious.

Crucifers. Several fields of broccoli were visited in the Ruskin area. Downy mildew (Peronospora parasitica) was found prevalent on most all lower leaves and many side leaves; but even though eventually causing yellowing and death of some of the leaves, it is probably not affecting the crop to any appreciable extent.

Many fields of cabbage in various stages of growth were observed. Except for rather prevalent downy mildew and occasional leaf spots on the ground leaves, the fields in general were apparently in good condition. Very rarely a case of black rot (Xanthomonas campestris) or of wilted plants due to foot rot, was observed, but in the total is not yet of importance. No serious trouble in any current seedbeds was encountered or reported.

Cucurbits. The total acreage planted in cucumbers was about 10. Only 2 fields observed in the Fort Myers area are still being picked. Downy mildew (Pseudoperonospora cubensis) had been very prevalent and had no doubt affected the vitality of the vines to some extent; but through frequent sprayings the crop had been extended through 10 or more pickings and the grower felt that his loss due to this disease was not of importance.

On squash, downy mildew was prevalent in all areas visited; some fields were only mildly infected where spraying had been maintained, but others apparently neglected showed plentiful spotting. Influence on the length of the picking season and on the total crop was not easy to estimate, but in some cases must definitely be important. No rotted fruits were noted in the generally younger fields around Fort Myers; but in the Bradenton and Ruskin areas considerable loss of young fruits (apparently due to Rhizopus, Choanephora [cucurbitarum] and probably other fungi) has been encountered in several fields. Sometimes only the youngest fruits are destroyed; occasionally those of considerable size are attacked. Loss has been claimed as high as 50%, although the average is much less. Severity of loss is perhaps underestimated at times, since so many of the fruits are taken when in the very young stages.

Eggplant. In the Fort Myers area the fields observed appeared to be in better condition than had been expected. The average stand of plants was noticeably better than that found in the Manatee-Ruskin area around Bradenton, perhaps owing to the fact that the fields seemed younger. Loss of plants due to Phomopsis vexans or other fungi did not exceed 10% in any field observed. The County Agent stated that this disease is generally worse on the spring crop than on the present winter crop planted in the fall. In the Manatee-Ruskin area the stand in many fields is very spotty. Losses due to fungi causing tip-over, stem cankers and other diseases have frequently been observed to exceed 50%, some fields being scarcely worth further care. On the whole, the average loss of plants in this area has been estimated to be from 15 to 20%.

Escarole. Escarole is grown extensively in Manatee County. It was generally observed to be in good condition during the growing period, with only an occasional head being affected with tipburn, mosaic (virus) or other trouble, and at harvest time it was generally in good condition for cutting. While decay of leaves touching the ground is common, it usually does not extend upward into the head and the rotted leaves can easily be trimmed away. One field was observed in the Ruskin section, however, in which this bottom rot (presumably due to Rhizoctonia solani) was progressing into the head, rotting many of the lower leaves and occasionally attacking the stalk also. Loss of marketable heads easily reached 20 to 25% in the oldest portion of the field; whereas in a portion just recently cut the loss was reported to be 1/3 of the crop.

Pepper. While marked variations in vigor and set of fruits exist among many fields, general condition as to disease occurrence has thus far been observed to be very good. Leaf spots have been noted as rarely of any importance, and spotting of fruits has generally occurred only where secondary organisms (Alternaria noted) have followed sunscald of the exposed surfaces. No marked or general occurrence of mosaic has been found in any of the fields observed.

Potato. Numerous fields were observed in the Fort Myers area, mostly in medium stages of growth, 5 to 6 weeks. Total plantings of this crop reach hundreds of acres in this section. The fields observed were of very full stand, of uniform growth, and apparently in good condition. Except for an occasional mild occurrence of Alternaria solani early blight spots or of scattered instances of mosaic (virus) or of leaf roll symptoms, there were no other diseases noticed. Late blight (Phytophthora infestans) is reported by the County Agent to be the worst hazard usually feared and may be encountered later.

Tomato. In the Fort Myers area, where the plants in the fields were relatively young and vigorous, neither early blight (Alternaria solani) nor Fusarium wilt (Fusarium bulbigenum var. lycopersici) were found to be of any importance in the cases observed. Since the vines are customarily allowed to spread over the ground and spraying must be curtailed, it is to be expected that the leaf blight may become somewaht of a factor in the life of the vines, and that fruit rots due to soil organisms will attack fruits in contact with the ground.

In the Bradenton-Ruskin areas, where most of the fields have now reached maturity, both Fusarium wilt and Alternaria early blight are prevalent and in some instances really of importance. There can be little question that, in some cases observed, a very appreciable percentage of leaf surface has

been injured through early blight and that the vitality of the plants has been affected; in many cases of lesser infection the actual damage is probably questionable. Fusarium wilt together with other wilt organisms have usually become more pronounced as the age of the plants advanced, with loss of plants that in some cases has been of importance. While the younger, more vigorous plants have frequently showed little or no signs of being infected, many of the older fields show wilted or dead plants to the extent of 25 to 30%. Mature, aging plants with no signs of infection somewhere through the fields, if of susceptible varieties, are of the exception. It seems fair to estimate an average loss of 10 to 15% of the plants in many of the fields observed. -- F. P. Schlatter, Emergency Plant Disease Prevention Project

East Coast of Southern Florida. - This survey was made along the lower east coast, from West Palm Beach to Homestead during the period December 6 to 17. In general a mild disease situation was found in the vicinity of Pompano. The manager of the Pompano State Farmer's Market stated that the disease situation was more favorable to date, perhaps than any other year that he can remember. In the Homestead area the season has been delayed because of wet ground. An excess rainfall of 8.8 inches occurred from July 1 to December 1. In October 500 acres of tomatoes and beans, and in November 1,000 acres of potatoes were estimated to have been drowned. These estimates were made by local agricultural officials.

Bean. Over 570 acres of beans were observed. Dr. George Ruehle participated in the survey near Homestead for several days.

Stem canker (Rhizoctonia solani) was found in traces up to 5% loss on 300 acres in the Pompano-Deerfield area. One large grower reduces the incidence of this disease by shallow planting and careful regulation of the water supply. In the east Homestead area, on the marl soil, stem canker is widespread with conservative estimates up to 10% loss or more in some fields.

Rootknot (Heterodera marioni) was found on 225 acres in the Pompano and Homestead areas, being severe only in a few spots.

Watery soft rot (Sclerotinia sclerotiorum) had not appeared around Pompano by December 13, in the same areas where it occurred last year, except a trace in one field on pods packed in the soil. East of Homestead it was well developed on the aerial parts at the time of the first known harvesting of beans on December 15. Sclerotia were already formed. In about 8 acres the estimated loss was 50 to 75% depending on how the beans were to be marketed. A small amount was found in another large field of snap beans and in several plantings of pole beans where a few of the smallest seedlings were found damped-off by this fungus. Apothecia were present. This fungus was found rotting cabbage on the ground. With the recent wet weather the situation appears very dangerous east of Homestead, particularly since the bean season has been delayed because of wet weather earlier.

Southern blight (Sclerotium rolfsii) was still found in traces to 5% in 240 acres in the Pompano area. Small patches of this disease were found in 10 acres east of Homestead where it was killing grown plants.

Crucifers. A number of seedbeds, and about 50 acres of crucifers in the field were observed.

In 3 1/2 acres of kale near Hollywood 2% loss from black rot was estimated. Near Fort Lauderdale black rot was widespread on 2 acres of young

cabbage. A loss of perhaps 70% was estimated on 2 acres east of Homestead.

Downy mildew destroyed several beds of crucifers in the Homestead area and was seen in the field on cabbage, collards and cauliflower. Dr. George Ruehle reports that mildew is widespread in the Homestead area. On 31 acres of kale near Hollywood, downy mildew was causing partial defoliation of the older leaves.

Cucurbits. About 20 acres of cucumbers were observed; downy mildew, was causing nearly a total loss of 2 acres near Homestead.

Mosaic (virus) caused a total loss in 25 acres of mature squash plants near Hollywood. An adjacent 10-acre field on the windward side had 38% mosaic. Continuing on in the same direction was another 15 acres of half-grown plants with 7% mosaic on the near side and 3% mosaic on the far side. Thus, the spread of the mosaic from the original field was easily traced.

Eggplant. Thirteen acres were seen in the Pompano-Deerfield area. Traces of Phomopsis leaf blight [P. vexans] were present. The worst trouble was a stem canker which killed 80% of the plants in 1/4 acre and 10% in another 3 acres. Dr. W. W. Ray is diagnosing this trouble.

Pepper. About 100 acres were observed in the field.

Leaf spot (Cercospora capsici) was general and severe, causing defoliation on 53 acres. A second leaf spot, thought to be Alternaria, was prevalent in spots.

Blight (Phytophthora capsici) was found in several fields; the estimated loss in 4 acres near Pompano was 5%.

Potato. Over 200 acres were examined. A small amount of early blight was found in the Homestead area.

The first, and only, known specimens of late blight from the Homestead area were brought to Dr. Ruehle on December 16. Apparently only a small amount was present.

Tomato. About 280 acres were observed in the field. Harvested fruits were observed at the markets. Early blight was present in moderate amounts in 60 acres; on 10 acres near Homestead the estimated loss was 75 bushels per acre. Bacterial spot (Xanthomonas vesicatoria) was partially responsible for a total loss of 4 acres near Boynton. Fusarium wilt caused a trace to 10% loss on 15 acres near Dania. It was responsible for a 30% loss on 1-1/2 acres near Pompano and 20% on 2-1/2 acres of rock land near Princeton. Rootknot caused 20 to 30% loss on 4-1/2 acres near Dania. From a trace to 6% mosaic was present in 60 acres of tomatoes near Dania and a trace was found in 10 acres east of Homestead. -- R. A. Hyre, Emergency Plant Disease Prevention Project.

VEGETABLE DISEASES IN LOUISIANA WINTER VEGETABLE AREAS: During the period December 13 to 18 winter vegetable areas were visited in St. Martin, Iberia, St. John the Baptist, and St. Bernard Parishes in Louisiana. In St. Martin and Iberia Parishes cabbage plants were either still in the plant beds or had just been recently transplanted into the fields. In this area a trace of downy mildew was observed on the seedling cabbages.

Accompanied by Dr. E. C. Tims a trip was made into the vegetable growing area below New Orleans, Louisiana. Numerous fields of carrots, endive, and escarole were examined but no diseases were noted in any of these crops. On cabbage plants a trace of black rot was observed in several fields but no apparent damage was present. Evidently cold weather had checked the

spread of this disease. Alternaria leaf spot was also found on cabbage plants. One field of broccoli was observed in which all plants were infected with alternaria leaf spot, both the vigorously growing and older leaves showing from a few to many spots.

Several fields of shallots were observed and a trace of pink root, Phoma terrestris, was found in most fields. In one field of 5 acres pink root had caused an estimated loss of 10% of the crop. The owner stated that the marketable shallots had been pulled 6 weeks previously and that those remaining in the field, 10%, would be a total loss. Many of these stunted plants were pulled and all showed pink root symptoms.

One field of shallots was observed that had been planted in garlic in the winter of 1942, in which 75 to 85% of the garlic had been lost due to white rot (Sclerotium cepivorum). This field of shallots was observed on November 30, 1943 and no symptoms of white rot were evident then. On December 18 typical white rot was found. In the most heavily affected areas counts showed 70% infected plants, with 15% infection in less severely affected areas. Many plants had been killed, while others were showing early symptoms. The total amount of infection on this date was 35% which will be lost by the grower. Seven additional small fields varying from 1/2 to 1 acre were observed in which white rot was beginning to appear and as the season advances severe losses will occur in these fields. -- L. H. Person, Emergency Plant Disease Prevention Project.

DISEASES OF VEGETABLES IN THE TEXAS WINTER GARDEN REGION: Aster-Yellows Outbreak on Carrots. An extensive survey, during which 529 acres were examined, was continued to ascertain the distribution and severity of aster yellows in the Winter Garden area. Observations were made on the severity of the disease, the stage of development of the host, the presence or absence of the vector.

County	Acreage observed	Average infection %	Range of infection %
Dimmit	298	30	4-69
Zavala	54	10	2-28
Bexar	95	25	16-62
Maverick	1	13	13
Uvalde	76	35	44-62
Atascosa	1	2	2
LaSalle	4	5	5

The amount of disease fluctuated according to the age of the carrots:

Age of carrots	Average infection (%)
1 month	1-3
2 months	7
3-4 months	38

The insect vector was observed in all of the plantings surveyed.

Diseases of Cabbage. (240 acres) The following diseases were observed on cabbage during this survey period: black rot, leaf spot (Alternaria brassicae) [?, black leaf spot, A. circinans], and dry or watery soft rot (Sclerotinia sclerotiorum). Black rot and leaf spot were observed in plantings near San Antonio (Bexar County) and Eagle Pass (Maverick County); the loss in each instance was negligible. A loss of nearly 5% in 2 plantings south of San Antonio could be attributed to Sclerotinia.

Cowpea. (140 acres surveyed). In a 40-acre planting of Black-eye peas in Atascosa County nearly 100% infection with rust (Uromyces phaseoli var. vignae) was observed, but the loss was only slight. Southern blight caused nearly 2% loss in a planting near Poteet, Atascosa County. Wilt (Fusarium spp.) was observed in 2 plantings near Poteet. A loss of nearly 15% was estimated in one; in the other, 20-acre, planting 3% of the plants were infected.

Eggplant. (180 acres surveyed). Yellows (virus) remains the most serious malady of eggplant in this area. Infection varied from 1% in a planting near Poteet, to nearly 100% in plantings in the Eagle Pass area.

Losses due to Phomopsis blight and fruit rot (Phomopsis vexans) were significant in large plantings in the Eagle Pass and Poteet areas. A loss of nearly 15% was attributed to this fungus in a small planting north of Eagle Pass; however, the estimate is perhaps excessive since owing to the late date of the first killing frost many more fruits were harvested than expected.

Lettuce. (55 acres surveyed). Lettuce plantings in Bexar and Dimmit Counties were infected by aster yellows virus. Losses ranged from 5 to 30% depending on the age of the lettuce. Drop or watery soft rot (Sclerotinia sclerotiorum) occurred in one small planting in Bexar County where it caused a loss of 3%.

Pepper. (185 acres surveyed). Wilt (Fusarium annuum) was observed causing considerable damage in plantings near Eagle Pass; in a 2-acre planting the loss was 25%. Cercospora leaf spot (Cercospora capsici) was fairly widespread but was causing very little loss in Maverick County. Bacterial spot (Xanthomonas vesicatoria) was observed in 2 plantings in Maverick County, occurring on both leaves and fruits but with negligible loss. Plants infected with mosaic (virus) were observed in most plantings surveyed. In one planting in Maverick County and another in Dimmit County the loss due to mosaic was estimated as nearly 25%.

Spinach. (1340 acres surveyed). Blue mold [downy] mildew (Peronospora effusa) was the most widespread and prevalent disease of spinach observed in Bexar, Dimmit, Frio, Maverick, Uvalde, and Zavala Counties. Infection varied from a trace to 100%.

White rust (Albugo occidentalis) was observed in one small planting in Dimmit County, and was widespread in Maverick County. In 2 75-acre plantings near Eagle Pass, Maverick County, the infection was nearly 100% and the loss could be estimated at nearly 35%.

In most plantings surveyed spinach plants with characteristic symptoms of aster yellows (virus) were observed. Loss was slight in most cases; however, in 2 plantings 12 miles north of Eagle Pass, the loss was nearly 40% in 130 acres.

A few examples of curly top (virus) infected plants were observed in most plantings; in no instance was infection greater than 2%.

Occasional plants affected by mosaic (virus) were observed in Maverick

County; loss was very slight if any.

Tomato. (135 acres surveyed). Early blight was widespread and prevalent in the plantings surveyed but loss in most instances was slight. Severe defoliation due to early blight was observed in a planting near Eagle Pass.

Southern blight (Sclerotium rolfsii) was observed in Atascosa County. A loss of nearly 2% of the plants in a 5-acre planting could be attributed to this disease.

Fusarium wilt was observed in Dimmit, Maverick, and Atascosa Counties. In the most severely affected planting a loss of nearly 5% was estimated.

Plants affected by the rootknot nematode were observed in all plantings surveyed in Atascosa County. Infection in this region varied from a few plants to nearly 25% of the plants in a 4-acre field.

Virus diseases were apparent in most tomato plantings surveyed. Characteristic symptoms of aster yellows, curly top, and mosaic were observed. Only a few plants were infected in the various plantings and little loss could be attributed to these viruses. -- Howard W. Larsh, Emergency Plant Disease Prevention Project. December 1-20.

VEGETABLE DISEASES IN CALIFORNIA: San Francisco Bay Region - One day of the week ending December 18 was spent in the field, in company with E. W. Bodine, in the vicinity of Palo Alto. The crops in this area consisted almost entirely of crucifers at this time of the year. The greatest acreage was in cauliflower and broccoli. An estimated 250 acres of these crops were examined. Traces of downy mildew (Peronospora parasitica) and black ring (virus) were found in most fields, particularly on cauliflower but the diseases were causing little damage. Several fields of cauliflower showed moderate to heavy infection with mosaic (virus). In one 40-acre field with approximately 50% diseased plants, the heaviest infection occurred near the edges of the field and the most severely damaged plants had apparently been infected when young. Although the actual loss in the crop cannot be determined until the time of harvest, it will probably be rather high in this field. In most fields the loss due to mosaic will probably be light.

The few fields examined in the Colma district indicated that the plant disease situation there had changed but little in the past few weeks. A heavier infection of leaf spot (Cercospora beticola) was found on chard at this time. Downy mildew (Peronospora schachtii) was still causing slight loss in garden beets. -- Horace L. Barnett, Emergency Plant Disease Prevention Project.

Santa Cruz, Monterey, and Kern Counties - The following diseases were found in the Salinas, Castroville and Watsonville areas in Monterey and Santa Cruz Counties and in the Lerdo and Edison areas in Kern County during the week ending December 25:

Artichoke. Some plantings in the Castroville and Watsonville areas were moderately to severely affected with the leaf spot (Ramularia cynarae). Several fields exhibited a distinct burning appearance.

Beet. In one field between Castroville and Salinas 30% of the beet plants were severely affected with downy mildew.

Carrot. Cercospora blight (Cercospora carotae) was very prevalent in all fields inspected in the Salinas area. All of the carrots in these fields

will be dehydrated. No loss in yield was apparent.

Celery. Aster yellows (virus) was found to be widely scattered in all fields in the Salinas and Castroville areas, but the damage was slight. An undetermined disease (possibly of virus nature) was found in a few fields in the Salinas and Castroville areas. A relatively small number of plants affected with this trouble were noticed. Based on symptom manifestations it appears to be the same as that reported occurring in the Santa Maria district [PDR p. 716, Dec. 15].

In general only a slight amount of late blight (Septoria apii) was found in the Salinas and Castroville areas. In one field, however, which had not been properly cared for, 80% of the plants were severely affected.

Crucifers. Ring spot (Mycosphaerella brassicicola) was very prevalent on brussels sprouts and cabbage in the Castroville and Moss Landing areas. In many fields, 100% of the plants were infected. In areas away from the coast no infected plants were found. Only a trace of infection was found on the heads of brussels sprouts, while in the cabbage there was considerable infection on the heads. Since the outer leaves are removed before shipping only slight loss was estimated. Cottony rot (Sclerotinia sclerotiorum) was found to be very prevalent on brussels sprouts in the Moss Landing area. In one large field 30% of the plants were affected. Other fields showed a trace to 3% infection. Cabbage fields in the same general vicinity showed only a slight amount of infected plants. A few scattered plants of brussels sprouts, cauliflower and broccoli were found affected with mosaic (virus) in all the areas inspected. Downy mildew was present in a slight amount in all fields of crucifers surveyed.

Cabbage and broccoli fields in Kern County were practically free of all diseases. In some cabbage fields especially on younger plants, the aphid population was high.

Lettuce. Cottony rot or drop (Sclerotinia sclerotiorum) was found in all lettuce fields inspected in the Salinas and Watsonville districts. The damage was slight.

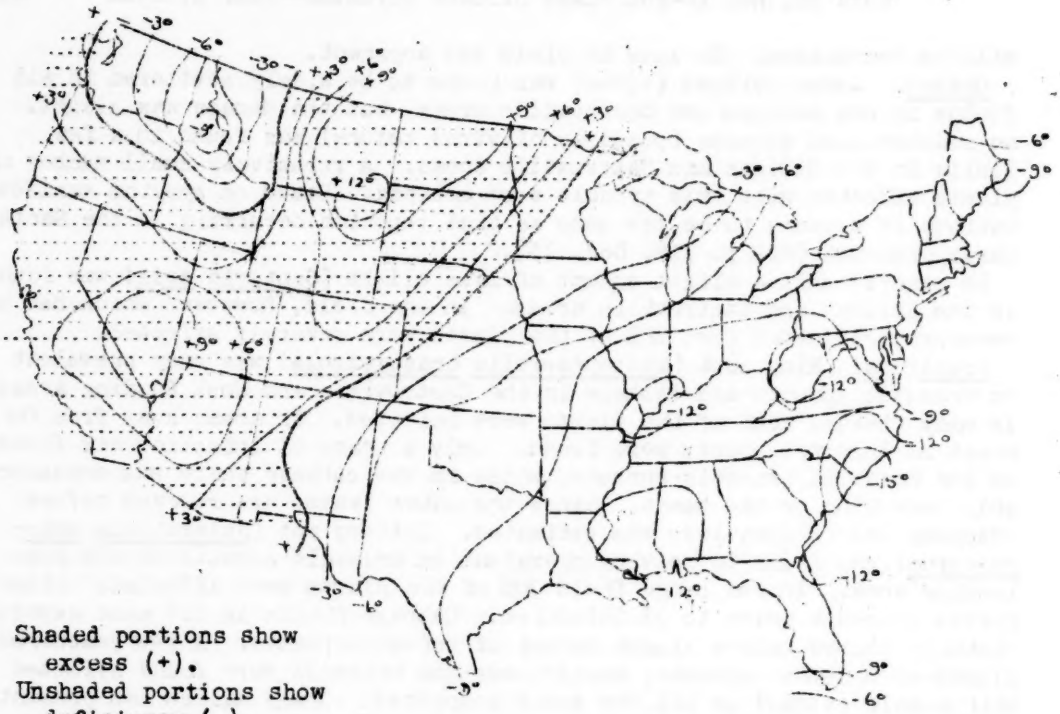
Pea. A trace of Cladosporium leaf spot (Cladosporium pisicola) was found on the winter peas in the Edison and Lerdo districts in Kern County. Many new plantings of peas inspected in these districts were found to be in a healthy condition. Some stands, however, in the Lerdo district were thin and spotty, but this was attributed to the planting equipment.

Spinach. Downy mildew was found generally in all fields in the Salinas, Castroville and Watsonville areas. Infection in some fields was high and a moderate amount of damage may result. -- E. W. Bodine, Emergency Plant Disease Prevention Project.

EXTENSIVE FROST DAMAGE IN SOUTH

(From U. S. Department of Commerce, Weather Bureau, Weekly Weather and Crop Bulletin for Week ending December 21, 1943).

Persisting through the late fall and early winter to an unusual extent, abnormally high atmospheric pressure again was the principal control of the week's weather. At the beginning of the period an extensive mass of polar



Shaded portions show excess (+).
Unshaded portions show deficiency (-).
Lines show amount of excess of deficiency.

Map 1. - Departure of Mean Temperature from the Normal for the Week Ending 7:30 a.m., E.S.T., December 21, 1943

air moved from the western Canadian Provinces southeastward over the northern Plains States, attended by subzero temperatures, while the line of freezing weather reached south-central Georgia.

The northwestern "high" of the early part of the week drifted slowly south-southeastward and covered all interior sections of the country by December 15, when it became stagnant for 2 or 3 days. During this period generally fair and cold weather was widespread east of the Rockies, with sub-zero temperatures extending as far south as a few localities in northern Arkansas and freezing weather to the Gulf Coast.

During the latter part of the week the pressure distribution became reversed with relatively high readings over the Southern States and a succession of weak "lows " moving eastward over the extreme North. This resulted in slowly rising temperature, except for persistent subnormal readings in the extreme Southeast. In northern Florida 4 days in succession, (December 16-19th) had subfreezing weather, with a minimum of 32° at Tampa on the 17th.

Map I shows that the weekly mean temperatures were far below normal over practically the entire eastern half of the country, with the greatest anomalies in the South. The northern Great Plains and the far Southwest had an abnormally warm week, but the interior of the Pacific Northwest was decidedly cold.

The abnormally cold weather in the more southern sections of the country

resulted in moderate to serious frost damage, extending from Texas eastward to the Atlantic coast. In central Gulf areas temperatures well below freezing reached the coast, while in the south Atlantic area snow, ranging up to 6 inches in depth, occurred as far south as South Carolina.

The most serious frost damage occurred in Florida, as indicated by the following preliminary report received from the Weather Bureau's Fruit-Frost Service in that State.

Damage to citrus negligible. Unprotected truck in Orlando, Plant City, Bartow, and Arcadia areas damaged 5 to 90 percent.

Strawberry bloom in Plant City area cut 75 percent on a reduced acreage, but no plant damage.

Tender truck in Sarasota-Bradenton area damaged 10 to 15 percent.

No harm to ferns in the Orlando-Sanford area as they were protected.

On the south and west sides of Lake Okeechobee, truck suffered extensive damage with four to five thousand acres of beans destroyed; also damage of 50 percent to two thousand acres of cabbage, and additional 10 to 15 percent to six thousand acres.

East side of Lake Okeechobee, three thousand acres of beans damaged, but many were saved through forced picking. Homestead area, tender truck damaged 25 percent. Estimated loss in Okeechobee area in excess of a million dollars.

Note. A supplemental report received today, December 21st, states that 85 percent of the remaining beans on the east side of Lake Okeechobee were destroyed this morning, but many additional beans were saved by forced picking yesterday.

Winter vegetable crops were rather seriously affected in other regions. Serious damage was caused in the lower Mississippi Valley, while the Rio Grande Valley of Texas also suffered considerable harm. While some areas were not so hard hit, the cold retarded growth.

NUT DISEASES IN THE PACIFIC NORTHWEST IN 1943

P. W. Miller

PERSIAN WALNUT. Walnut bacteriosis (Xanthomonas juglandis (Pierce) Dowson) was very prevalent in the Pacific Northwest in 1943. It is estimated that approximately 35% of the potential walnut crop in non-sprayed orchards in Oregon and Washington was either completely destroyed or the quality adversely affected by bacteriosis. In certain regions in Oregon, losses from this disease were very severe, ranging from 45 to 60%.

Downy leaf spot (Microstroma juglandis (Berng.) Sacc.) occurred in limited amounts in a number of widely scattered orchards in Western Oregon. It was apparently of no economic importance, however, as it did not decrease the functional leaf area to any significant extent.

Ring spot (Ascochyta juglandis Bolt.) was found on the foliage in several widely scattered orchards in Western Oregon in 1943. It did not appear to be causing any economic damage, however, as the lesions were not sufficiently abundant per leaf infected to cause any significant decrease in the functional leaf area.

Leaf scorch (non-parasitic) was widely distributed in the Pacific North-

west in 1943, occurring in greater or less amounts in practically every Persian walnut orchard in Oregon and Washington. In certain orchards it was of considerable economic importance as it caused a significant decrease in the functional leaf area.

"Black-line" (girdle) of grafted walnuts (non-parasitic) caused the death of a relatively large number of grafted walnut trees, 12 to 25 years of age. All trees affected belonged to the Franquette variety grafted on California black walnut rootstocks (Juglans hindsii Jepson) or hybrids of other species with this one. The same variety grafted on Persian seedling rootstocks (Juglans regia L.) was not observed to be affected.

A non-parasitic die-back of twigs and branches occurred in a number of widely-distributed Persian walnut orchards in Oregon in 1943. In general, this disorder was more prevalent in orchards located on "marginal" soils of the "heavier" type. The incidence of this disorder has been appreciably reduced in certain orchards by the application of borax to the soil at the rate of 4 to 5 pounds to the tree.

FILBERT. Bacterial blight (Xanthomonas corylina Miller et al.) was widely distributed in Oregon in 1943. However, it was not generally so prevalent nor so severe as in 1940 or 1941. Tree losses from this disease in young orchards, 1 to 3 years of age, ranged from less than 1 up to 10% with an estimated average loss of around 3%. While no trees over 5 years of age were known to have been killed by this disease, it did cause the death of some potential fruiting twigs and branches which indirectly reduced the crop. In certain orchards, it is estimated that the bacterial blight caused an indirect loss of as much as 20% of the crop, though the average general loss probably did not exceed 5%.

Mildew (Phyllactinia corylea (Pers.) Karst.) occurred in widely scattered orchards in Oregon during the late summer and fall of 1943. It was of little, if any, economic importance, however, as the diseased leaves retained their normal green color until the end of the season and persisted on the trees to the time of normal leaf fall. It is thought that the lateness of the attack was largely responsible for the apparent lack of damage.

Leaf scald (non-parasitic) was widely distributed in the Pacific Northwest in 1943, occurring in greater or lesser amounts in practically all filbert orchards in Oregon and Washington. Where the disorder was very prevalent, it caused considerable economic damage as it resulted in a significant reduction in the functional leaf area. In general, the trouble was worse in orchards located on relatively shallow soils with limited reserves of moisture.

DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES

APRICOT DISEASES IN THE SANTA CLARA VALLEY IN 1943

C. E. Yarwood

Heavy losses of apricot blossoms and young fruits, resulting in a crop estimated at 30% of normal 1/ for the state of California, occurred during

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1/ California crop and livestock reporting service, California fruit and nut crops. May 1, 1943 and August 1, 1943. Mimeo.

the first 3 weeks of March 1943. At Hollister, center of one of the most intensive apricot regions, there were 13 days with rain during the 3 weeks following full bloom on March 1, 1943, and this compares with an average of 6.3 days and a maximum of 11 days with rain during the same bloom period for the 15 years preceding 1943.[2/] In Alameda, Santa Clara, and San Benito Counties, Botrytis cinerea, Sclerotinia sclerotiorum, Sclerotinia [Monilinia] fructicola, and Sclerotinia [Monilinia] laxa, in this order of prevalence, were usually associated with the observed rotting of blossoms and young fruits. Inoculation with pure cultures of these organisms, isolated earlier from rotting fruits and blossoms, caused a rapid rot of detached, uninjured fruits similar to that observed in the field in the latter part of the epidemic.

Grower applications of bordeaux just prior to full bloom for the control of brown rot blossom blight (S. laxa), and experimental applications of bordeaux and Cuprocide following blossoming did not appear to reduce losses. The heaviest set of fruit observed in any orchard was in one receiving no copper spray in 1943. Single experimental applications of 0.1 to 0.3% Fermate to 6 single trees in 3 orchards on March 2 to 15 apparently increased the set of fruit by 64% and increased the yield of fruit on 3 trees by 73%.

In the 2 cases observed where orchards were in clean culture at time of apricot blossoming, the fruit set was greater than in the average of 31 orchards where there was a seeded or volunteer cover crop.

Apricot twig blight due to Sclerotinia laxa was of about normal prevalence. In 33 orchards examined an average of about 5% of the current season's twigs showed brown rot blighting and the maximum observed in part of one orchard was 55% twig infection. Later, brown rot of ripe fruit (Sclerotinia fructicola) affected less than 1% of the fruits in the 3 orchards where counts were made.

Powdery mildew (Podosphaera oxyacanthae) occurred later and was less abundant than in recent years. In August and September it became conspicuous in the centers of the trees on the upper leaf surfaces, and was more abundant near Hayward than elsewhere. No fruit infection was observed and little if any injury was present.

Apothecia of Lambertella pruni were found on apricot and prune mummies at one location near Hollister on March 10. The fungus was identified by H. H. Whetzel and this appears to be the first record of the fungus in California.

DIVISION OF PLANT PATHOLOGY, UNIVERSITY OF CALIFORNIA, BERKELEY, CALIFORNIA

2/ Days of rain in relation to blossoming period was determined from data of full bloom as reported by C. H. Keaton of California Packing Corporation, and from rainfall data as published in Climatological Data of the U. S. Department of Agriculture.

FERMATE SPRAY FOR CONTROLLING CRANBERRY FIELD ROTS

R. B. Wilcox

The efficacy of Fermate in controlling cranberry fruit rots in New Jersey was given a preliminary test during the summer of 1943. An old bog with a deep growth of vines of the variety Howes was chosen where rots were known to have been heavy in spite of commercial spraying with bordeaux mixture. Some false blossom, a virus disease, was present.

Twenty-seven small plots (3 x 4 feet) were laid out in randomized blocks, 9 plots to be sprayed with Fermate, 3 lbs. per 100 gallons; an equal number with bordeaux 4-4-50; and the remainder to be unsprayed. Calcium caseinate at the rate of 1 lb. per 100 gallons was added to each fungicide. Sprays were applied with a knapsack sprayer at the rate of 300 gallons per acre. Because of an error in the first application one block was eliminated, leaving 8 replications of each treatment. Five applications were made, at 2-week intervals except for the last spray, which was delayed for another week. The first application, on June 26, was given early in the blossoming season of the cranberries; the second came at about the height of bloom; and the third after most of the berries had set. The weather was unusually rainy during the spring and until after the second application; there was a moderate rain on July 22, 2 days before the third application; but precipitation was negligible from then until September 30, when the berries were fully colored.

Harvesting was begun on October 4. At that time it was noted that the vines on the Fermate plots were in exceptionally good condition, and that there appeared to be little rot present, while most of the fruit on the unsprayed plots was rotten; spray residue was so heavy on the bordeaux plots that it was difficult to judge the condition of the berries. All fruit was carefully harvested from each plot and was sorted and counted as soon as possible to determine the percentage of field rot. The sound berries were weighed and then placed in storage to learn the degree of control of storage rots. The results on control of field rot were so definite as to be worth presenting, since they are not likely to be greatly altered by the development of rot in storage. No attempt was made to determine the fungi involved in decay of berries in the experiment but it is known that Guignardia vaccinii Shear and Acanthorhyncus vaccinii Shear are responsible for most of the field rot in New Jersey.

Table 1. -- Results of spray test on cranberries, New Jersey, 1943

	Unsprayed	Bordeaux	Fermate
Total number of berries per plot	677.9	749.9	882.0
Percent rotten berries at time of harvest	89.53	58.36	5.13
Average weight of sound berries (gms)	0.815	0.882	0.934
Yield of sound fruit (expressed as barrels per acre)	4.3	18.0	51.7

The results of the preliminary sorting are shown briefly in Table 1. The differences in percentage of rot are highly significant (at the 0.1% level of t), as are those on yield of sound fruit. Differences in average berry weight are significant at the 5% level. Total numbers of berries per plot, which are considered to reflect the control of fungus "blast" of blossoms, are less uniform, owing partly to various degrees of false-blossom infection on the plots, but the difference between the unsprayed and Fermate treatments is significant; the mean for bordeaux is probably equally significant, since it occupies almost precisely the same intermediate position as it does in the highly significant percentage of rotten fruit.

It will be seen that the bordeaux mixture spray gave approximately 35% control of field rot, while the figure for Fermate was 94%. Some explanation must be made of the poor showing of bordeaux. This fungicide has long been the standard for cranberry-rot control. However, it has been recognized that the first-season spraying of a badly rotting bog in New Jersey merely reduces the rot, and that 2 or 3 successive seasons of treatment are usually required to obtain satisfactory control, while in certain places such control has never been secured. In other words, bordeaux is effective only under conditions of a light or moderate spore load. In the New Jersey bogs the spore load is frequently excessive, as in the present experiment, and bordeaux is unable to hold the fungi in check.

The relative effectiveness of Fermate is noteworthy. Moreover, it did not seem to depress the cranberry growth; in fact, the Fermate plots were in better condition at the end of the season than were those receiving bordeaux, possibly because of more complete control of fungi on the leaves, and the fruit was definitely larger. There seems to have been no blossom damage from spraying in full bloom; instead, the set of fruit was increased. And a decided advantage was the complete absence of visible Fermate residue on the harvested fruit in spite of the lack of rainfall after the third spray.

Only one dosage of Fermate was tested in this experiment. It is possible that a lower concentration of the fungicide will give adequate rot control under less severe conditions.

DIVISION OF FRUIT AND VEGETABLE DISEASES

ALCOHOLIC FLUX OR WHITE SLIME FLUX OF TUNG TREES

John R. Large

A disease similar to alcoholic flux or white slime flux of oak was found on tung trees [Aleurites] near Folsom, Louisiana, by Ernest Angelo, in October 1943. It is known to have occurred on tung in the vicinity of Covington, Louisiana, where it was first observed by George F. Potter in September 1938, and was studed and described by Hines 1/ in 1939 and 1940. However, during 1941 and 1942 it was not observed in any tung orchard in the United States.

1/ Hines, Lee. The disease situation in tung. Annual Proc. Amer. Tung Oil Assn. 6:12-14, 1940.

A foamy exudate is seen bubbling from cracks in the bark near the crotch in late summer, usually during early September. This is accompanied by the characteristic odor of fermentation which attracts hornets, beetles, and other insects. Later in the season an icicle-like mass of gelatinous flux extends down the trunk of the tree from the crotch canker. Eventually death of the tree results from girdling of the trunk. Guba 2/ describes a similar disorder of oak and other shade trees which he considers entirely physiological, due to sunscald, cold, or other injuries. However, Hines (loc. cit.) eradicated the disease from tung trees by excision of diseased tissue and painting the wound with bordeaux paste. Otherwise it appeared to be carried over from one year to the next in old cankers, and trees that survived attack in one season usually succumbed the second year. He consistently isolated a bacterium from freshly diseased tissue but was unable to produce infection with his pure cultures. A bacterium and an organism considered to be an Actinomycete have been isolated from the 1943 tung canker by the writer. Further studies are in progress.

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2/ Guba, E. F. Slime flux. National Shade Tree Conference Proc. 10: 56-60. 1934.